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Uses of Outer Space
Scientific and Technical Subcommittee
Fifty-eighth session
Vienna, 19-30 April 2021
Item 12 of the provisional agenda¹
Long-term sustainability of outer space activities**

**United Kingdom: Update on our reporting approach for the
voluntary implementation of the Guidelines for the
Long-term Sustainability of Outer Space Activities**

The present conference room paper was prepared by the Secretariat on the basis of information received from the United Kingdom. The information was reproduced in the form it was received.

¹ A/AC.105/C.1/L.387



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United Kingdom: Update on our Reporting Approach for the Voluntary Implementation of the Long-Term Sustainability Guidelines of Outer Space Activities

1. The United Kingdom is pleased to submit a Conference Room Paper for the consideration of the Committee on the Peaceful Uses of Outer Space's membership at the 58th session of the Scientific and Technical Subcommittee (STSC).
2. Following a decade of hard and exceptional work, the United Nation's Committee on the Peaceful Uses of Outer Space successfully adopted at the Committee's 61st session, in 2019 the preamble and 21 guidelines for the long-term sustainability of outer space activities (hereafter referred to as "the LTS guidelines" or "the guidelines"). The UK remains committed to taking measures to implement the guidelines to the greatest extent feasible and practicable. The UK reaffirms its strong belief in the value of member states not only implementing the guidelines, but in also sharing the approaches, practices and lessons learnt in doing so. This will ultimately contribute to a discussion on operationalising the guidelines, determining good practice, as well as identifying any gaps and challenges that can be addressed through targeted capacity-building efforts.
3. Accordingly, the UK presented one approach to implementation-reporting at the 57th session of the STSC in document [A/AC.105/C.1/2020/CRP.15](#). A copy of this template for capturing the implementation of the guidelines is provided in Annex 1 and continues to be used to support this updated CRP in 2021.
4. The UK is now pleased to provide its 2021 update to this proposed reporting format in time for the 58th session of the STSC, under Annex 2 below. This year has been an important and eventful one for the UK in regulating outer space activities and in ensuring that the LTS Guidelines are integrated into our approach. Highlights for this year include:
 - The commencement by summer 2021 of the new Space Industry Act 2018 (SIA) regime;
 - The launch of the new UK Space Regulator for outer space activities;
 - Refinement of the UK's policy on registration;
 - Achievements on space weather, both domestically and with international partners; and
 - Launching our first-ever capacity-building project through UNOOSA, titled: *The Promoting Space Sustainability Project Awareness-raising and capacity building related to the*

implementation of the LTS Guidelines. The website for the awareness of Member States can be found [here](#)¹.

5. The UK would welcome comments and questions related to our voluntary reporting; the reporting template; and an opportunity to discuss the practicalities of implementation with other member States. This will contribute to an informed discussion towards the reporting on implementation, as well as identifying capacity-building requirements, once the new LTS Working Group has been established.

ANNEX 1

Guideline Reference	Guideline summary	Nation
Thoughts or approach to implementation	<i>This should be used to provide either the current thoughts on how member state intends to consider implementing this guideline or, if already underway, the current approach to implementing this guideline.</i>	
Current progress and/or proposed future activities	<i>This should be used to provide information on the current progress on the approach to implementation or this guideline if already underway, as well as future activities to either begin or continue implementation this guideline.</i>	
Experiences, challenges and lessons learnt	<i>This should be used to provide information on any relevant experience on the practical implementation of this guideline, including any new practices or procedures to enhance implementation, or details of lessons learnt, or challenges encountered or overcome.</i>	
Comments on specific needs for capacity building necessary to support implementation	<i>This should be used to provide information or comments on specific capacity building requirements that member states may have in order to assist in the implementation of this guideline.</i>	

¹ The Promoting Space Sustainability Project: Awareness-raising and capacity building related to the implementation of the LTS Guidelines: <https://www.unoosa.org/oosa/en/ourwork/topics/promoting-space-sustainability.html>

ANNEX 2

A. Policy and regulatory framework for space activities

A.1	Adopt, revise and amend, as necessary, national regulatory frameworks for outer space activities	United Kingdom
Thoughts or approach to implementation	<p>The SIA is being used as an opportunity to update and further develop the UK regulatory regime for authorising outer space activities. The Act will provide the relevant framework for licensing launch, return, orbital, spaceport and range control activities from the UK and ensure that such activities are carried out safely, securely, sustainably and in line with the UK's international obligations. The OSA will continue to govern space activities carried out by UK nationals overseas.</p> <p>The UK also intends to establish a new Space Regulator, sited within the Civil Aviation Authority (CAA)². The intended Space Regulator will take over from the UK Space Agency (UKSA) as the independent safety regulator for UK space activities.</p>	
Current progress and/or proposed future activities	<p>The Regulations and Guidance which will underpin the SIA have now been drafted in conjunction with legal and technical experts and a public consultation concluded in March 2021. The provisions under the new regime are expected to come into force during the second half of 2021.</p> <p>Work is on-going to establish the new Space Regulator, whose launch will coincide with the coming into force of the SIA (second half 2021).</p>	
Experiences, challenges and lessons learnt	Both activities are still ongoing.	
Comments on specific needs for capacity building necessary to support implementation	The UK has had significant experience in developing a new regulatory framework and are very happy to discuss our experiences with nations considering doing the same.	

A.2	Consider a number of elements when developing, revising or amending, as necessary, national regulatory frameworks for outer space activities	United Kingdom
Thoughts or approach to implementation	<p>The current UK licensing process explicitly assesses the potential risks to people, property, public health and the environment for in-orbit operation and space object re-entry, and this will soon also include assessment of launch activities under the SIA.</p> <p>Safety assessments carried out by the Regulator under the Outer Space Act 1986 take into account international best practice, technical standards (incl. ISO and ECSS), and guidelines (incl. IADC). International best practice, such as the international Space Debris Mitigation guidelines, have also been incorporated into the SIA.</p>	
Current progress and/or proposed future activities	The OSA and the SIA will jointly ascertain UK jurisdiction over launch, return and orbital activities, as well as associated sites, such as mission management facilities, spaceports and range control. The two Acts will regulate activities	

² Subject to final approval via the UK Parliamentary process.

	<p>located within the UK and those exercised by UK nationals overseas. The OSA is currently in effect. A public consultation on the SIA concluded in March 2021 and we expect the Act to commence in 2nd half 2021.</p> <p>The UKSA currently authorises orbital activities and ensure that these are safe, secure and aligned to the UK's international obligations. The new independent Space Regulator, established under the SIA and expected to launch in 2021, will assume these functions from the UKSA as well as the authorisation regimes for launch, return, spaceports and range.</p>
Experiences, challenges and lessons learnt	The UK's non-prescriptive, outcome-based authorisation regimes provide flexibility by design. This flexibility, alongside proactive engagement with the space industry and community will be key to ensuring that the rapid pace of change in technology and operational practice can be adequately taken into account.
Comments on specific needs for capacity building necessary to support implementation	The UK has had significant experience in licensing activities in orbit and in developing new regulatory frameworks. We are very happy to discuss our experiences with nations considering doing the same.

A.3	Supervise national space activities	United Kingdom
Thoughts or approach to implementation	<p>Under the OSA all space activities carried out by UK nationals require prior authorisation by means of a licence and must be conducted in a safe and sustainable manner. As part of the licensing process, the Regulator carries out financial checks on the operating entity to ensure that sufficient finances are available to support safe operations, including appropriate decommissioning at the end-of-life. In addition, throughout the life of the space object, the Regulator performs annual health checks of the licensed spacecraft to ensure they are still operating within the envelope of the original scope of the licensed activity.</p> <p>The SIA expands upon the existing requirements of the OSA and introduces further checks around the background and qualifications of key individuals within the operating entity. Licensees are held to update the regulator on any changes in key personnel to ensure that safe and responsible operations can be maintained throughout the full lifespan of the space object.</p>	
Current progress and/or proposed future activities	Implementation is executed through the licensing function of the UK Space Agency through a rigorous license assessment process to ensure that missions meet key safety and sustainability criteria. The UK Space Agency has a licensing team comprised of regulatory and technical experts to perform license assessment of space activities. As missions become more complex, the UK is reconsidering its approach to supervision and the introduction of additional mission rules for reporting the health of the space mission. This includes the development of new quantitative assessment approaches to assess and ensure long term sustainability of activities.	
Experiences, challenges and lessons learnt	As space activities are becoming more complex, involving a greater number of international intergovernmental and industrial actors, it has required greater international coordination both during authorisation and supervision process. Ensuring long-term sustainability requires international agreed consensus on how this is defined.	
Comments on specific needs for capacity building necessary to support implementation	The UK has had experience in licensing and supervising national space activities and are very happy to discuss our experiences with nations considering doing the same, as well as explore specific enabling needs in capacity building.	

A.4	Ensure the equitable, rational and efficient use of the radio frequency spectrum and the various orbital regions used by satellites	United Kingdom
Thoughts or approach to implementation	Ofcom is the national administration by direction of the UK Secretary of State under section 22 of the Communications Act 2003 ("2003 Act"). Ofcom has statutory duties under the 2003 Act and the Wireless Telegraphy Act 2006 ("2006 Act") to regulate the provision of electronic communications networks and services and the use of the electro-magnetic spectrum, which includes that used by satellites	
Current progress and/or proposed future activities	Ofcom has developed its own national Procedures for the Management of Satellite Filings ("Procedures") to ensure that spectrum and orbital resources are utilised as efficiently and economically as possible.	
Experiences, challenges and lessons learnt	Ofcom regularly reviews its procedures and updates them in line with outcomes of the World Radiocommunication Conference and the evolution of the satellite sector.	
Comments on specific needs for capacity building necessary to support implementation	The UK has had significant experience in developing a new regulatory framework, and are very happy to discuss our experiences with nations considering doing the same.	

A.5	Enhance the practice of registering space objects	United Kingdom
Thoughts or approach to implementation	The UK has formalised current registration practices and is implementing policy for the registration of satellites launched from the UK under the new Space Industry Act 2018 regime. The UK will seek agreements on registration with other relevant launching States prior to a UK Launch, taking account of which launching State is best placed to assume operational control and jurisdiction over the satellite.	
Current progress and/or proposed future activities	The UK has worked bilaterally with other States party to the UN Space Treaties to jointly determine the appropriate State of Registry for upcoming missions. The UK will set out its approach to registration in guidance to potential licence applicants. The UK will continue to engage on registration in international fora.	
Experiences, challenges and lessons learnt	As space activities are becoming more complex, involving a greater number of international intergovernmental and industrial actors, it has required greater international coordination. There is no consensus or internationally agreed criteria for determining the State of Registry, giving rise to a wide range of registration practices internationally.	
Comments on specific needs for capacity building necessary to support implementation	The UK currently registers space objects for which it is responsible and would welcome the opportunity to discuss these experiences with other States and explore specific enabling needs in capacity building. Given the interdependencies with the Liability Convention and SST the UK would welcome further engagement to reach a shared understanding of criteria for registering space objects.	

B. Safety of space operations

B.2	Improve accuracy of orbital data on space objects and enhance the practice and utility of sharing orbital information on space objects	United Kingdom
Thoughts or approach to implementation	The UK continues to implement this guideline through our Space Surveillance and Tracking (SST) capability.	

Current progress and/or proposed future activities	<p>The UK is continuing to invest in our national SST capability, including funding in 2020 for seven projects to improve or develop sensors and investigate machine learning applied to SST.</p> <p>Civil analysts work alongside their military counterparts in the UK Space Operation Centre, liaising with international partners and contributing to the UK Space Agency's support of organisations like the IADC.</p>
Experiences, challenges and lessons learnt	The use of common, internationally recognized standards to enable information exchange, which can be a potential barrier to collaboration.
Comments on specific needs for capacity building necessary to support implementation	The UK welcome the opportunity to discuss collaborative approaches to improving the accuracy of orbital data and enhanced sharing of information.

B.6	Share operational space weather data and forecasts	United Kingdom
Thoughts or approach to implementation	<p>The UK Met Office hosts the UK's national space weather monitoring, warning and forecasting capability at the Met Office Space Weather Operations Centre (MOSWOC). A range of warnings, alerts, advisories and summaries are produced, together with output from a range of models specific to particular thematic phenomena. These support UK government, critical national infrastructure, responder communities and the public, and are made available free at the point of delivery to users in the UK and international partners. As one of only 3, 24/7/365 space weather expert staffed centres globally, MOSWOC has a close working relationship with the other two such centres in the US at NOAA SWPC and USAF 557th WW. Many data sources and much model output is freely shared between these centres.</p> <p>The Met Office works with a number of international partners to develop space weather observing and forecasting capability and in doing so, share data, model output and knowledge about space weather phenomena and impacts. The Met Office has a well established relationship with ESA, where services are provided to support four of the ESA Space Weather - Expert Service Centres, that form the pre-operational ESA Space Weather Services Network. These are available free at point of delivery via the ESA Space Weather Services portal. As a WMO member the Met Office supports WMO Resolution 40 (Cg-XII) which commits to the principle of free exchange of observational data, information and derived products in near real-time between WMO national centres.</p> <p>Several UK organisations collect space weather data from ground-based sensors (magnetometers, ionosondes, SuperDARN radars and GNSS measurements) and make it available nationally and internationally via existing domain-specific networks (e.g. Intermagnet). These organisations include research council institutes, universities and government agencies. The UK has also contributed to development of several space-based sensors now operated on US platforms, e.g. the Heliospheric Imager on the STEREO mission.</p>	
Current progress and/or proposed future activities	<p>The UK is playing a leading role in the development of the ESA Lagrange space weather mission.</p> <p>Under the Space Weather Innovation, Measurement, Modelling and Risk (SWIMMR) Programme, new observations of the radiation environment at ground level and at a range of altitudes, including satellite orbital domains will be developed. A number of new operational space weather models will also be delivered through the SWIMMR programme which will lead to additional and enhanced nowcasting and forecasting services.</p>	

Experiences, challenges and lessons learnt	A key issue that encumbers the useful sharing of space weather data, is the limited international standardisation and harmonisation, both of data & supporting metadata. Existing standards (e.g. IAGA2002 for magnetometer data exchange) need to be brought into a comprehensive approach for space weather data.
Comments on specific needs for capacity building necessary to support implementation	Alongside the sharing of operational data and forecasts it is important to consider training and technical support to develop the capabilities of nations with emerging space weather ambitions. The Met Office in the UK has provided such support to nations including the Netherlands and South Africa to support their own development of operational space weather services.

B.7	Develop space weather models and tools and collect established practices on the mitigation of space weather effects	United Kingdom
Thoughts or approach to implementation	<p>The Met Office currently uses a number of space weather models which largely mirror those used at other operational centres. The UK SWIMMR programme will deliver a number of new operational space weather models and tools to the Met Office. This will create more diversity, which will in turn help improve forecasting, through enhanced understanding of the strengths and weaknesses of different approaches. International collaboration in activities to compare and validate and models would be beneficial.</p> <p>The UK has made considerable efforts to assess the risk and socioeconomic impacts of adverse space weather effects on technological systems, especially impacts on critical national infrastructure, both ground- and space-based. These efforts include expert advice in the form the development of reasonable worst case space weather scenarios by the UK Space Environment Impacts Expert Group, and a review by the UK Royal Academy of Engineering. This advice has led to inclusion of severe space weather in the UK National Risk Register (latest version published in December 2020). The expert advice and the Register are all openly available. In parallel, UK experts have carried out several detailed socio-economic studies of space weather impacts, and have published their results in the peer-reviewed literature. This body of work has provided a base of evidence for recent decisions on UK investment in space weather mitigation including forecasting and new space-based observations.</p>	
Current progress and/or proposed future activities	The UK has a strong research base in space weather research with around 30 active research groups based in universities and research institutes. These are undertaking a wide range of research including curiosity-led studies, targeted research on power grid and satellite impacts, and transitional research to support infrastructure protection. A key element now underway is a ~£20M programme (Space Weather Space Weather Instrumentation, Measurement, Modelling and Risk, SWIMMR) that started late in 2019. This programme is designed strengthen a range of national space weather capabilities, including development of space weather models with the specific goal of transitioning those models into operational use at our national forecast centre (MOSWOC).	
Experiences, challenges and lessons learnt	We are developing a dedicated software infrastructure to facilitate the transition of space weather models into operational use. This is proving to be a key tool in building up collaboration between research and operations teams.	
Comments on specific needs for capacity building necessary to support implementation	Good public communication is an essential element in managing the wider societal and economic impacts of natural hazards – and space weather is no exception. The UK has carried out a Public Dialogue activity that provided useful insights to what is needed to ensure effective public communication.	

C. International cooperation, capacity-building and awareness

C.1,C.2,C.3, C.4	<p>C.1 - Promote and facilitate international cooperation in support of the long-term sustainability of outer space activities</p> <p>C.2 - Share experience related to the long-term sustainability of outer space activities and develop new procedures, as appropriate, for information exchange</p> <p>C.3 - Promote and support capacity-building</p> <p>C.4 - Raise awareness of space activities</p>	United Kingdom
Thoughts or approach to implementation	<p>The UK has a strong desire to foster international cooperation between nations to develop a coordinated approach to space sustainability. To achieve this the UK is an active participant in various international and national forums performing research into the space environment, such as the Inter-Agency Space Debris Coordination Committee (IADC).</p>	
Current progress and/or proposed future activities	<p>One route that the UK is taking is by supporting the advancement of the IADC. The IADC is comprised of 13 space agencies who are performing active research into space debris mitigation. The UK contributes to the technical research performed by the IADC which forms the basis of the guidelines and best practice which the committee develops to support and guide sustainable operations by all space actors.</p> <p>In 2020-21, as part of the UK Space Agency's National Space Innovation Programme, the UK is proud to have funded our very-first project through UNOOSA to support the tangible implementation of the LTS Guidelines. This project:</p> <ul style="list-style-type: none"> - published the LTS guidelines in an accessible-publication; - develop an accessible-publication containing the LTS guidelines, in all six official languages of the UN; - will establish an e-platform on UNOOSA's website for reporting on LTS implementation; and - saw UNOOSA host three expert events (with industry, space agencies, regulators) to discuss the operationalisation of the guidelines, which identified 45 operational case studies in implementation. <p>To promote inclusivity and awareness, this project also aims to inform future UNOOSA capacity-building efforts to promote the future sustainability of outer space and will assist all actors to engage in the future working group on LTS.</p> <p>The project homepage can be found here³. The full-press release announcing the project can be found here⁴. The accessible publication of the LTS guidelines, in English, can be found here⁵. The recordings of the three LTS expert events can be found here⁶.</p>	
Experiences, challenges and lessons learnt	<p>It is important that forums include appropriate inputs from public, private and academic sectors to ensure that correct conclusions are made.</p>	

³ Project Homepage: <https://www.unoosa.org/oosa/en/ourwork/topics/promoting-space-sustainability.html>

⁴ Press Release: <https://www.unoosa.org/oosa/en/informationfor/media/press-release-un-office-for-outer-space-affairs-and-uk-government-sign-agreement-to-promote-the-sustainability-of-outer-space.html>

⁵ LTS Guidelines: https://www.unoosa.org/documents/pdf/PromotingSpaceSustainability/Publication-Final_English_version.pdf

⁶ LTS Expert Events: <https://www.youtube.com/watch?v=sA6ISDJfgMA&list=PLaOqa4cng0GE-uXvixHCJbGH4CPUznxin>

Comments on specific needs for capacity building necessary to support implementation	The UK welcomes the opportunity to discuss approaches to enhance international cooperation and capacity building.
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D. Scientific and technical research and development

D.1	Promote and support research into and the development of ways to support sustainable exploration and use of outer space	United Kingdom
Thoughts or approach to implementation	The UK seeks to continue implementation through continued support on the development of new technology, both through national programmes and projects overseen by the European Space Agency (ESA). Through both avenues there are opportunities to fund technology that seek to minimise the environmental impact of space assets throughout their lifecycle.	
Current progress and/or proposed future activities	As an example of current progress, through national investments the UK has supported the development of innovative “green” propulsion systems. In addition, through ESA the UK has led studies into a range of equipment that would improve the ability for a spacecraft to demise.	
Experiences, challenges and lessons learnt	It is important to consider and support the development of technologies that minimise the environmental impact of space activities throughout their lifecycle	
Comments on specific needs for capacity building necessary to support implementation	The UK welcomes the opportunity to discuss approaches and build partnerships on how this might be accomplished through-out the international community.	

D.2	Investigate and consider new measures to manage the space debris population in the long term	United Kingdom
Thoughts or approach to implementation	<p>The UK supports the development of new technological and operational solutions in the domain of Active Debris Removal (ADR) and In-Orbit Servicing (IOS) missions to address the long-term challenges of the space debris population. Where carried out, the UK believes that open and transparent operations are key prerequisites to building trust and acceptance within the international community for such activities.</p> <p>These efforts complement the UK existing regulatory approach which requires UK licensees to demonstrate safe operations through collision and debris mitigation measures and end-of-life disposal plans.</p>	
Current progress and/or proposed future activities	<p>In recent years, the UK has supported a number of measures at the national and international level.</p> <p>Domestically, the UK has licensed demonstration ADR missions, including RemoveDEBRIS (2018) and ELSA-d (2021). The UKSA is also working on the development of a framework policy for more general ADR and IOS missions.</p> <p>Internationally, the UK has supported European Space Agency (ESA) efforts through the funding of programmes promoting the responsible and sustainable use of space, including the Advanced Research in Telecommunicating Systems (ARTES), the General Support Technology Programme (GSTP) and the Space Safety Programme. The UK has also participated in the Swiss-led Clearspace-1 project under ADRIOS (removal of uncooperative targets) and the Sunrise project under ARTES (de-orbiting constellation satellites).</p>	

	<p>The UK is leading separate work through UN disarmament structures to prevent an arms race in outer space by defining responsible space behaviours. This work includes discussions on limiting or prohibiting many military activities that could result in the creation of large volumes of debris such as testing Direct Ascent Anti-Satellite missiles.</p>
<p>Experiences, challenges and lessons learnt</p>	<p>In developing further ADR/IOS missions, we continue to face a number of challenges in the commercial (market for ADR services), legal (unattributed debris) and regulatory domains (development of complex licensing policy, coordination on ADR/IOS missions involving space objects of different nationalities).</p>
<p>Comments on specific needs for capacity building necessary to support implementation</p>	<p>The UK has experience in licensing safe and sustainable orbital operations and would welcome the opportunity to discuss current experience and approaches to ADR and IOS missions with other members of the international community.</p>